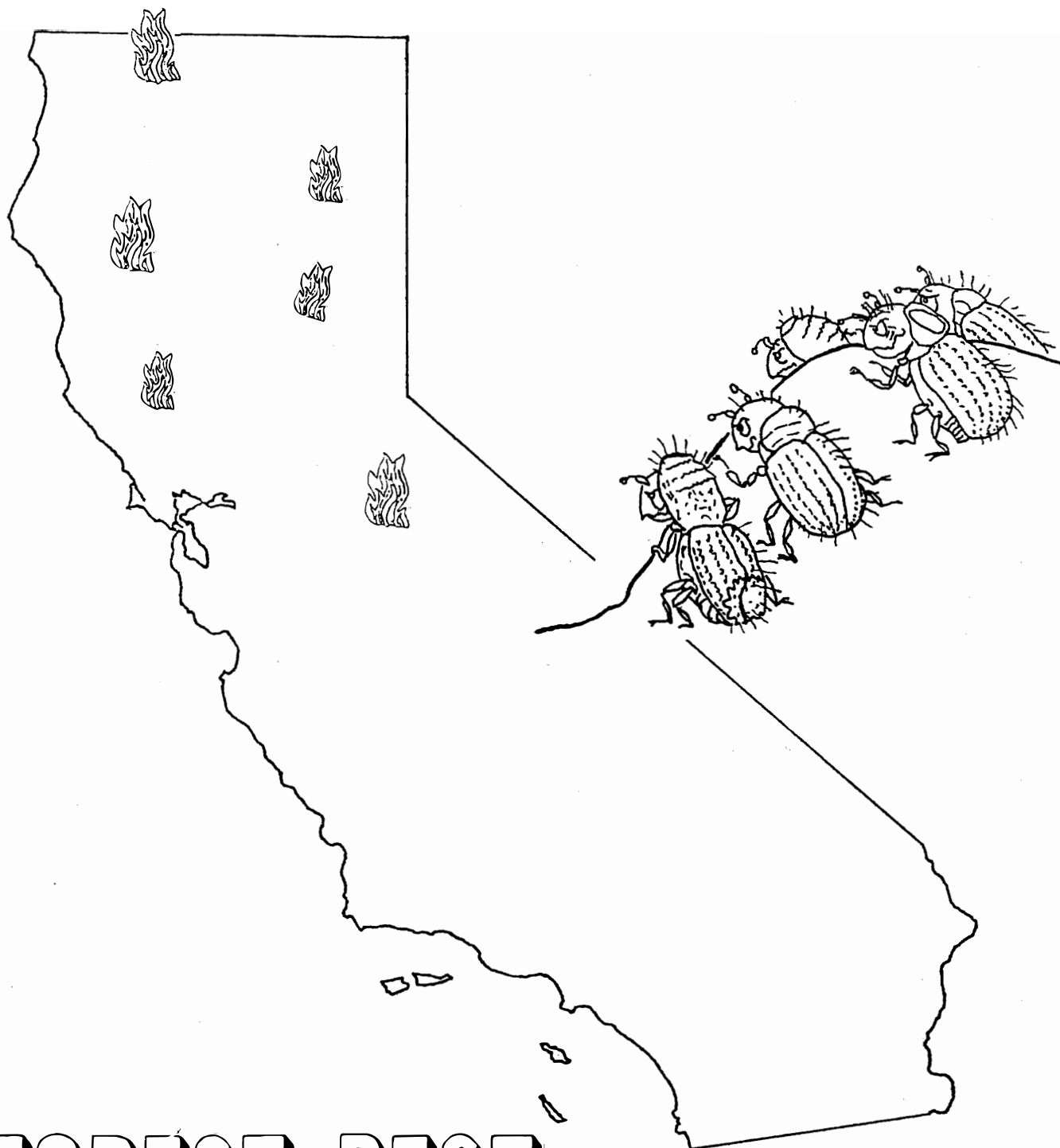




FOREST PEST CONDITIONS IN CALIFORNIA - 1987

A PUBLICATION OF THE CALIFORNIA FOREST PEST COUNCIL

THE CALIFORNIA FOREST PEST COUNCIL (formerly the California Forest Pest Control Action Council) was founded in 1951. Its membership is open to public and private forest managers, foresters, silviculturists, pathologists, entomologists, zoologists, and others interested in the protection of forests from damage caused by animals, insects, diseases, and weeds. Its objectives are to establish, maintain, and improve communication among individuals -- managers, administrators, and researchers -- who are concerned with these issues. These objectives are accomplished by four actions:

1. Coordination of detection, reporting, and compilation of pest damage information
2. Evaluation of pest conditions.
3. Pest control recommendations made to forest managing agencies and landowners.
4. Review of policy, legal, and research aspects of forest pest control, and submission of recommendations thereon to appropriate authorities.

The California Board of Forestry recognizes the Council as an advisory body in forest pest protection. The Council is a participating member in the Western Forest Pest Committee of the Western Forestry and Conservation Association.

This report, **FOREST PEST CONDITIONS IN CALIFORNIA - 1987**, is compiled for public and private forest land managers to keep them informed of pest conditions on forested land in California, and as an historical record of pest trends and occurrences. The report is based largely on information provided by the Statewide Cooperative Forest Pest Detection Survey, and from information generated by Forest Pest Management, Pacific Southwest Region, USDA Forest Service, while making formal detection surveys and biological evaluations.

The report was prepared by the Forest Service in cooperation with other member organizations of the Council. It was duplicated and distributed by the California Department of Forestry and Fire Protection.

COVER PHOTO: The fire season of 1987 was severe; more than 700,000 acres of forest were damaged. Previously, these same forests were stressed from subnormal precipitation in 1986-1987. As a result, losses of damaged trees to bark beetles and wood borers may be substantial in 1988-1989 without timely salvage and a return to normal precipitation levels.

Sacramento

January 29, 1988

FOREST PEST CONDITIONS IN CALIFORNIA - 1987

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HIGHLIGHTS OF PEST CONDITIONS - 1987

STATUS OF INSECTS. Bark beetle activity was generally low in the spring, but by late summer the number of fading pines increased throughout the Sierra Nevada and Cascade Mountains. White fir mortality generally remained low. Reports were limited because of attention devoted to the fire season.

The level of defoliation from the Modoc budworm declined from that of the past four years. The infestation of bitterbrush rangeland by the Great Basin tent caterpillar remained unchanged in Inyo and Mono Counties. An outbreak of Douglas-fir tussock moth on white fir occurred at several discrete sites within an area of 5,000 to 10,000 acres of Plumas County. Activity of other native defoliators was stable or declined.

Gypsy moth trap catches in California remained low. The situation in Lane County, Oregon continued to improve, with aerial application of Bacillus thuringiensis limited to 12,000 ac. However, seven male moths were caught in Josephine County, Oregon, just 20 miles north of Del Norte County, California.

STATUS OF DISEASES. In general, no significant increases in forest disease effects were noted in 1987. Pitch canker of pines, a newly discovered disease in California, was found in new areas along the central California coast. Additional research into this disease of hard pines is underway, but no eradication efforts are presently planned.

Several reports of foliage dessication were received. Ponderosa, Jeffrey, and Coulter pines were affected in several areas. Trees had typical winter drying symptoms with browning of previous year's needles, followed by bud break and the emergence of green needles in 1987.

Symptoms of Elytroderma needle disease were more obvious in areas where the disease has been reported historically. Branch flagging and seedling mortality of lodgepole pine due to western gall rust were increasingly apparent in north central and northeastern California.

Surveys for ozone injury to pines in the Lake Tahoe Basin revealed more injury than previously reported. Symptoms were found in areas not previously known to be affected by ozone.

STATUS OF WEEDS. Weeds were a continuing problem for the growth and survival of conifers throughout the state. The importance of weed control was illustrated by the intensity of fires in areas where brush fields were present.

STATUS OF ANIMAL PESTS. The forest animal damage survey was not conducted in 1987.

STATUS AND CONTROL OF INSECTS

WESTERN PINE BEETLE, Dendroctonus brevicomis. The low level of activity in 1986 and the widespread shortage in winter precipitation resulted in few spring reports of pine mortality. Those received were related to overstocking and underburning. However, beetle activity was increasing in the pine types of the Sierras and Cascade Mountains by late summer and fall. Approximately 1500-2000 pines were fading in scattered spots across the McCloud Flats (Siskiyou County). Scattered spots of 4-15 trees were reported near Etna (Siskiyou County). About 200 ponderosa pines were killed east of Covelo (Mendocino County); and pine mortality was noted near and in Boggs Mountain Demonstration State Forest (Lake County).

PINE ENGRAVER BEETLES, Ips spp. Mortality and top-killing caused by pine engravers was reported from plantations of ponderosa pine in Siskiyou and Placer Counties, stands of sawtimber ponderosa pine in Lake and Placer Counties, and as a result of trees left after road construction east of Laytonville (Mendocino County). Improper maintenance of ornamental Monterey pine resulted in tree mortality in Humboldt County. Minor incidences were noted in Mendocino and Napa Counties on Monterey and Bishop pines.

FIR ENGRAVER, Scolytus ventralis. This engraver remained a prominent mortality factor in the red and white fir of Trinity County. Increased white fir mortality was reported from the Arrowhead/Big Bear areas of San Bernardino County. Beetle activity in Placer County was related to moisture stress induced by human activity. However, moisture stress caused by recent subnormal precipitation has not yet resulted in widespread reports of fir mortality from engraver attack.

RED TURPINTINE BEETLE, Dendroctonus ventralis. This species remained a common scolytid beetle in Yosemite National Park. Pines under stress in campground and developments were frequent hosts, but the beetle was found throughout the Yosemite Valley. In Mendocino County the beetle was associated with site disturbance. In Santa Cruz County the red turpentine beetle and the Monterey pine Ips, Ips mexicanus, were associated with the death of Monterey pines with pitch canker disease.

DOUGLAS-FIR ENGRAVER, Scolytus unispinosus. This engraver caused top-kill of mature Douglas-firs in various areas of Humboldt and Mendocino Counties, and killed sapling and pole-sized Douglas-firs in Mendocino County.

MOUNTAIN PINE BEETLE, Dendroctonus ponderosae. Nearly 25 second-growth ponderosa pines were killed east of Willits (Mendocino County). The pockets of mortality were densely stocked. An infestation in lodgepole pine continued near Tuolumne Meadows in Yosemite National Park (Tuolumne County).

JEFFREY PINE BEETLE, Dendroctonus jeffreyi. Reports were received of increased mortality of Jeffrey pine in the Garner Valley (San Bernardino County).

GYPSY MOTH, Lymantria dispar. The gypsy moth situation in California has been relatively stable over the past few years (Table I). The only site treated for eradication in 1987 was at Encino (Los Angeles County). The infested property and all others within 1/8 mile (a total of 9 properties) were treated with two ground applications of Dimilin 25-W in late March and early April. There were also three aerial applications of Bacillus thuringiensis in late March to late April on 43 acres surrounding the infested property.

Single male moths were trapped in Bakersville (Kern Co.), Sunnyvale (Santa Clara Co.), Pleasanton (Alameda Co.), El Segundo and Woodland Hills (Los Angeles Co.), and Nevada City (Nevada Co.). Additional life stages were found on a property in Pleasanton. Because a recent interstate transfer was involved, this was considered a regulatory incident. No sites are proposed for eradication in 1988.

TABLE I. CALIFORNIA GYPSY MOTH SITUATION

Years	Traps Placed	Adults Trapped	Counties	Properties with Eggs/Pupal Cases	Sites Treated
1984	30,000	25	9	2	5
1985	28,000	28	10	3	2
1986	27,000	20	9	1	0
1987	19,000	6	5	1	1

The gypsy moth situation generally continues to improve in Oregon. As of mid-September, only 66 males had been trapped statewide, compared with 227 moths trapped by that time in 1986. The Lane County infestation near Eugene accounted for 29 of the moths trapped during 1987, compared with 46 moths in 1986. No moths were trapped this year near Glide (Douglas County) in what had been a separate infestation. The program to eradicate the infestations near Eugene and Glide was in its third consecutive year. The eradication area has shrunk each year, from an initial 227,000 acres in 1985, to 194,000 acres in 1986, to only 12,000 acres treated in 1987. The infestations were aerally treated three times each year with Bacillus thuringiensis.

The only discouraging news from Oregon is that 7 male moths have been trapped at 3 sites south of Cave Junction (Josephine County). If an infestation becomes established at that location, there would be a potential source of gypsy moths just 20 miles north of Del Norte County, California, along U.S. Highway 199.

DOUGLAS-FIR TUSsock MOTH, *Orgyia pseudotsugata*. An outbreak of the Douglas-fir tussock moth on white fir was reported in August, 1987, over a total gross acreage of 5,000 to 10,000 acres in Plumas County. The outbreak has developed in several discrete areas of light to heavy defoliation ranging in size from 25 to about 200 acres, mostly on ridge tops and upper slopes. Areas of moderate to heavy defoliation are located north of La Porte in the vicinity of Little Grass Valley Reservoir and south and west of Quincy on the Plumas National Forest, and south of Peacock Peak (west of Lake Almanor) on the Lassen National Forest. Some of the heaviest defoliation and highest levels of 1987-88 egg masses were observed along ridges south of Meadow Valley (Quincy District). White fir of all age and size classes have been defoliated to varying degrees. Evidence of virus activity (limp larvae, putrid pupae) has been observed in several areas, but appeared particularly heavy in one area near La Porte, and this population is likely to collapse in 1988. Forest Pest Management conducted egg mass surveys and virus analyses (in cooperation with the Forest Sciences Laboratory, Corvallis, Oregon) in the fall.

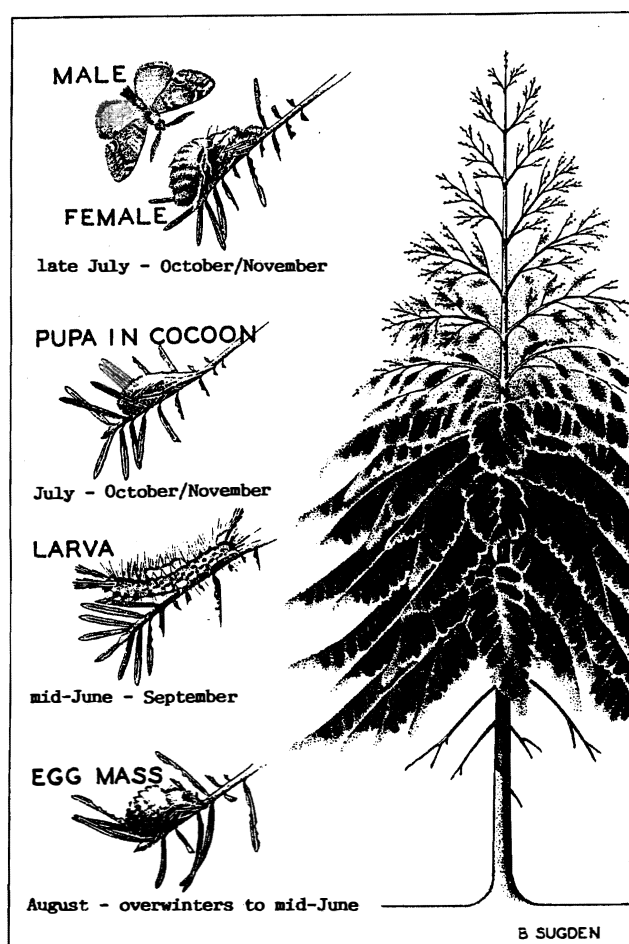


Figure 1. Life cycle of the Douglas-fir tussock moth in California. (Illustration courtesy of the Forest Insect and Disease Survey of the Canadian Forestry Service.)

The 1987 pheromone/cryptic shelter survey data is not yet available, but populations in other areas apparently remain low with no reported defoliation other than an area of scattered, light defoliation detected over 50 acres near Lumberyard (El Dorado County). Results from the 1986 field test of DFTM mating-disruption are being analysed. Initial indications are that this cooperative (Forest Sciences Laboratory, Corvallis - Forest Pest Management, R5) test achieved a 70 to 80% reduction in mating success, as measured by viable egg masses produced per female.

DOUGLAS-FIR TWIG WEEVIL, Cylindrocopturus furnissi. Extensive branch flagging in sapling and pole-sized Douglas-fir occurred in and north of Willits and east of Laytonville (Mendocino County). Most of the damage occurred on unthrifty trees within abandoned Douglas-fir plantations.

NANTUCKET PINE TIP MOTH, Rhyacionia frustrana. The California Department of Food and Agriculture collected the Nantucket pine tip moth several times from Sunol (Alameda County) in April and at Fresno (Fresno County) during March. The moth was first detected in northern California during 1986 in two commercial nurseries near Sunol. The previous range was limited to Kern, Orange, San Bernardino and San Diego Counties.

BALSAM TWIG APHID, Mindarus abietinus. Large populations of the balsam twig aphid appeared this spring on 2-0 white fir seedlings at the Placerville Nursery (El Dorado County). Effects of feeding include deformation and discoloration of the current needles, stunting and deformation of elongating shoots and a profusion of white wax and honeydew. Heavy feeding in some areas of the affected blocks will result in many seedlings being culled after lifting. The infestation was monitored briefly and then treated with malathion because of spread within the blocks.

Interest in the balsam twig aphid is likely to remain high. White fir has become a major species planted at Placerville Nursery where it has largely replaced sugar pine. A constant reservoir of balsam twig aphid is maintained at the nursery because overlapping crops of 2-0 white fir are grown. Some of the major unanswered questions include the life cycle of the balsam twig aphid at Placerville, effects of planting block configuration on aphid spread or buildup, and control techniques that would be effective.

MODOC BUDWORM, Choristoneura retiniana. The Modoc budworm caused light to moderate defoliation of white fir on 25,000 acres in the Warner Mountains and the Manzanita Mountain area of Modoc County. The level of defoliation was significantly reduced as compared to that of the last four years. Defoliation occurred at Halls Meadow, Stowe Reservoir, south from Deep Creek to Soup Springs, Mahogany Ridge, and Manzanita Mountain.

LODGEPOLE NEEDLEMINER, Coleotechnites milleri. Populations in Yosemite National Park were at their lowest levels in 20 years; even some refuge areas had low levels.

SUGAR PINE TORTRIX, Choristoneura lambertiana. Lodgepole pine throughout the Warner Mountains was defoliated by the sugar pine tortrix. This defoliation ranged from light to moderate, which was a significant reduction in the level of defoliation from 1986.

GOUTY PITCH MIDGE, Cecidomyia piniinopis. This insect continued to damage a number of young plantations of ponderosa pine in northern California. It also caused severe defoliation in saplings, poles, and small sawtimber in three natural stands on the McCloud District, Shasta-Trinity National Forest (Siskiyou Co.). Most unusual was the size of some pines. Many were greater than 20 inches dbh and over 100 ft in height. Yet, only the uppermost whorls, often only 10 to 20% of the crown, had escaped heavy attack.

TENT CATERPILLAR, Malacosoma sp. The tent caterpillar infestation on antelope bitterbrush in Inyo and Mono Counties continued for the fourth year at about the same level as 1986, with approximately 15,000 acres of moderate to heavy defoliation. Areas with continuing defoliation include Tobbacco Flat, Hot Creek, Convict (very high populations), Mammoth Junction and Little Antelope Valley (Mammoth Ranger District) and Aeolian Buttes/West Portal on the Mono Lake Ranger District. Little bitterbrush mortality has occurred to date, but observations in late September suggested that plants in several areas are suffering from moisture stress in addition to defoliation. Virus was again detected in the Convict population at levels similar to 1986, but has not yet caused significant population reduction.

WHITE FIR NEEDLEMINER, Epinotia meritana. Light to heavy defoliation to both red and white fir by the white fir needleminer was reported from several locations throughout the Sierra Nevada and north to Modoc County, totalling approximately 5,000 to 6,000 acres. Several areas of red fir were defoliated in Sequoia-Kings Canyon National Park, including Mineral King (500 acres), Paradise Ridge (2,200 acres), River Valley (200 acres), west fork, Clover Creek (200 acres) and Colony Meadows (500 acres). Defoliation was particularly evident on poles and small sawtimber, although red fir of all sizes were affected. An additional 200 acres of defoliation was noted adjacent to the park on the Hume Lake Ranger District (Tulare County). Other areas of white fir needleminer activity include the Kings River Ranger District (Fresno County), the west slope of Granite Peak, Truckee Ranger District (Nevada County), near Sardine Lookout, Sierraville Ranger District (Sierra County) and in the vicinity of Ferris, Milford Ranger District (Plumas County). The white fir needleminer was again reported feeding on white fir along with the Modoc budworm in the Hunters Ridge-Manzanita Mountain area on the Big Valley Ranger District in Modoc County.

EUCALYPTUS BORER, Phoracantha semipunctata. The eucalyptus borer did not appear to increase its range in 1987. However, there was a substantial number of trees killed by this roundheaded borer in the city of Industry (Los Angeles County). Research efforts at U-C Riverside are focused on natural predator control. Additional shipments of predators are expected from Australia for testing.

WESTERN PINESHOOT BORER, Eucosma sonomana. In 1986, damage was observed on the rootstock of ponderosa pine in the Happy Camp Cooperative Clone Bank (Siskiyou County). In 1987 two-foot strips of Hercon Luretape were tied in the upper crowns on a 30 ft grid over the 10-acre site and a 100 ft buffer zone. Ten sticky traps baited with 1 inch strips of the Luretape were randomly placed in the site to monitor the effectiveness of the control. The first male moths were caught between March 23 and March 30, and flight continued through May 4. Damage to rootstock trees in 1986 was 4%, and 2% in 1987. The treatment will be repeated in March of 1988.

CONE AND SEED INSECTS. Poor cone crops and the time demands of fire suppression reduced the number of cones delivered to the Placerville Nursery. Damage in sugar pine cones was minor; ponderosa and Jeffrey pine cones had light damage from seedworms, Cydia spp. The red fir cones examined were lightly damaged. White fir cones from the Eldorado National Forest were lightly infested with a variety of insects; while those from the Sierraville District, Tahoe National Forest, were heavily infested with Earomyia spp. and moderately infested with Eucosma siskiyouana. A coneworm, Dioryctria sp., was common and about 25% were parasitized.

Collection of Douglas-fir cones in Sonoma County was prevented by extensive damage to the cone crop. Associated insects were not identified.

Figure 2. Pine terminal stunted by the boring of a western pineshoot borer. (USDA-Forest Service)



TABLE II. INSECTS OF LESSER IMPORTANCE IN CALIFORNIA FORESTS - 1987

INSECTS		HOSTS	WHERE EXAMINED OR REPORTED	
Scientific Name	Common Name		County	Remarks
<u>Archips</u> <u>argyrospilus</u>	Fruittree leafroller	BO	San Bernardino	Low level
<u>Cicada</u> sp.	Cicada	DF	Mendocino	Oviposition wounds
<u>Coleotechnites</u> sp.	Jeffrey pine needleminer	JP	Nevada. San Bernardino	Low level
<u>Chionaspis</u> <u>pinifoliae</u>	Pine needle scale	PP	Mariposa	Yosemite N. P.
<u>Dioryctria</u> sp.	a pine coneworm	BP	Humboldt	Leaders of seedlings
<u>Elatobium</u> <u>abietinum</u>	Spruce aphid	SS	Humboldt	Chronic, iso- lated roadside & ornamental trees
<u>Eurytoma</u> <u>tumoris</u>	Eurytoma gall midge	SC	Santa Cruz	Christmas trees
<u>Halisidota</u> <u>argentata</u>	Silverspotted tiger moth	WF	Modoc	Scattered locations
<u>Ips</u> <u>mexicanus</u>	Monterey pine ips	MP	Santa Cruz	Attacking pines with pitch canker
<u>Matsucoccus</u> <u>bisetosus</u>	Ponderosa pine twig scale	PP JP	Plumas	Graeagle, less than in 1986
<u>Melanophila</u> <u>drummondi</u>	Flatheaded fir borer	DF	Mendocino	Killed mature roadside and dry-site trees
<u>Nuculaspis</u> <u>californica</u>	Black pineleaf scale	SP	Butte	Along Rt. 39, on 10-30% of sugar pine
<u>Nymphalis</u> <u>californica</u>	California tortoiseshell	CN	Monterey, Yuba Siskiyou	High populations

TABLE II. (Cont.)

INSECTS		HOSTS	WHERE EXAMINED OR REPORTED	
Scientific Name	Common Name		County	Remarks
<u>Phloeosinus</u> sp.	a cedar bark beetle	AZ	Angeles	
<u>Platynota stultana</u>	Omnivorus leafroller	SP	El Dorado, Butte	Nursery stock
<u>Pityophthorus</u> sp.	Twig beetle	SPP	Ventura, El Dorado	
<u>Rhyacionia zozana</u>	Ponderosa pine tip moth	PP	Tuolumne	
<u>Scythropus</u> sp.	a pine needle weevil	JP	Siskiyou, Plumas	
<u>Toumeyella liriodendri</u>	Tulip tree	TT	Alameda	One property
<u>Xyela</u> sp.	a primitive sawfly	PP	Modoc	

HOST ABBREVIATIONS

AZ = Arizona cypress	BO = Black oak
BP = Bishop pine	CN = <u>Ceanothus</u> sp.
DF = Douglas-fir	JP = Jeffrey pine
MP = Monterey pine	Oa = Oaks
PP = Ponderosa pine	RF = Red fir
SC = Scots pine	SP = Sugar pine
SPP = Singleleaf pinyon pine	SS = Sitka spruce
TT = Tulip tree	WF = White fir

STATUS AND CONTROL OF DISEASES

ABIOTIC DISEASES. Winter drying and desiccation of needles was reported on several conifer species: ponderosa pine on Georgetown Ranger District, Eldorado National Forest (El Dorado County); Coulter pine at the Big Pines Station, Valyermo Ranger District, Angeles National Forest (Los Angeles County); Jeffrey and ponderosa pine at the Kentucky Mines Museum on Downieville Ranger District, Tahoe National Forest (Sierra County); Jeffrey pine at Seymour Sage Flat, Mt. Pinos Ranger District, Los Padres National Forest (Ventura County); and ponderosa pine, Jeffrey pine, sugar pine and white fir in the Shovel Grave Plantation, Calaveras Ranger District, Stanislaus National Forest (Calaveras County). Ponderosa and Jeffrey pines at two locations on south-facing slopes bordering Mountain Meadows Reservoir (Lassen County) showed typical symptoms of red belt--a desiccation of foliage caused by a combination of warm winter weather and cold soil conditions. All trees were expected to recover.

Dieback of white fir attributed to environmental conditions was found in the McCarthy Plantation on LaPorte Ranger District, Plumas National Forest (Plumas County), and in a small group of trees at Moorridge, California on Big Bear Ranger District, San Bernardino National Forest (San Bernardino County).

Winter damage was evident on snowbrush on 1000 acres of private land at the southern edge of the 1960 Donner Fire, 2 miles east of Truckee (Nevada County).

Ponderosa pine, deerbrush, and manzanita were killed by the application of magnesium chloride to a road surface for dust abatement near Sourgrass Meadow on Calaveras Ranger District, Stanislaus National Forest (Tuolumne County).

AIR POLLUTION. The Forest Service evaluated 27 plots for symptoms of ozone injury on the Sierra National Forest (Madera and Fresno Counties) in 1987. Compared to an evaluation of these plots in 1985, ozone symptoms: 1) increased on 17 plots, 2) decreased on 5, and 3) remained the same on 5. Most of the changes were minor and overall injury to trees remains in the slight and moderate categories. During the 10 years that these plots have been followed, 8 trees (about 3 percent) with severe symptoms have died.

Personnel from Crocker Nuclear Laboratory, UC-Davis, completed a ground survey for ozone injury to pines around Lake Tahoe (El Dorado and Placer Counties, California; Washoe and Douglas Counties, Nevada). Five hundred twenty-five trees were examined and rated for ozone at 40 plot locations. Foliar injury was found at 25 of the plots; most injury was classified as slight. This was the first formal survey for ozone impact to conifers in the vicinity of Lake Tahoe. The only previous report of symptoms found near the lake was from Luther Pass in 1979.

CANKER DISEASES. An annual branch and stem canker caused by Sclerophoma semenospora was found on Douglas-fir saplings and poles on the Gasquet and Lower Trinity Ranger Districts, Six Rivers National Forest (Humboldt County). Fusicoccum (Fusicoccum sp.) canker was found on madrone along Georgetown Divide (El Dorado County) and in Santa Cruz County.

Pitch canker of pines, caused by Fusarium subglutinans, was found in California for the first time in mid-1986. Subsequently, the disease has been identified in seven locations along the central California coastal area, mainly on Monterey pine. The largest infestation, covering approximately 23 square miles, is located in and around Santa Cruz (Santa Cruz County). The smallest infestation contained only a few trees.

Surveys were developed in early 1987 to determine intensity of pitch canker development in areas of known infestation, and to locate any other infested areas. In summary, pitch canker has been found in the Santa Cruz area; Watsonville area, including Pajaro (Monterey County); the San Leandro-Hayward-Union City area (Alameda County); two small sites along Highway 280 (San Mateo, Santa Clara Counties); and several infected trees each in south San Jose (Santa Clara County) and Salinas (Monterey County).

DWARF MISTLETOES, Arceuthobium spp. Updated estimates, based on previous inventories, were made of the incidence of dwarf mistletoes in the state. The area infested is about equally divided between National Forest and other ownership lands at 1.2 million acres of commercial forest land in each category. [NOTE: The estimates of area infested probably need to be adjusted downward because of the large acreage of forestland affected by this year's fires.]

Four direct suppression projects were conducted on Forest Service and Park Service managed lands in 1987. Moraine Campground and the nearby Village in the Cedar Grove complex, Kings Canyon National Park (Fresno County), were treated through tree removal and pruning of ponderosa pine. Two projects were conducted on the Lake Tahoe Basin Management Unit. The final phase of the Jeffrey pine removal and pruning project was completed in Nevada Beach Campground (Douglas County, NV). Subsequent to the operation, dwarf mistletoe-resistant Jeffrey pine seedlings were planted in portions of the campground. Jeffrey pines in and surrounding Fallen Leaf Campground (El Dorado County) were pruned as part of a vegetation management plan that will be completed through a planned timber sale. A suppression project was initiated in the High Country Recreation Area, Angeles National Forest (Los Angeles County) to protect Jeffrey pine through pruning and tree removal.

FOLIAGE DISEASES. Few reports of needle or leaf diseases were made in 1987. The limited occurrence of foliage diseases resulted from sparse precipitation in the spring during bud break and foliage expansion. Symptoms of Elytroderma needle disease (Elytroderma deformans) were more common in 1987 in several areas, including Georgetown Divide (El Dorado County), the south shore of Lake Tahoe (El Dorado County), and McCloud Flats (Siskiyou County). Scirrhia (Dothistroma) pini was reported on Monterey pine in a Christmas tree farm (Humboldt County).

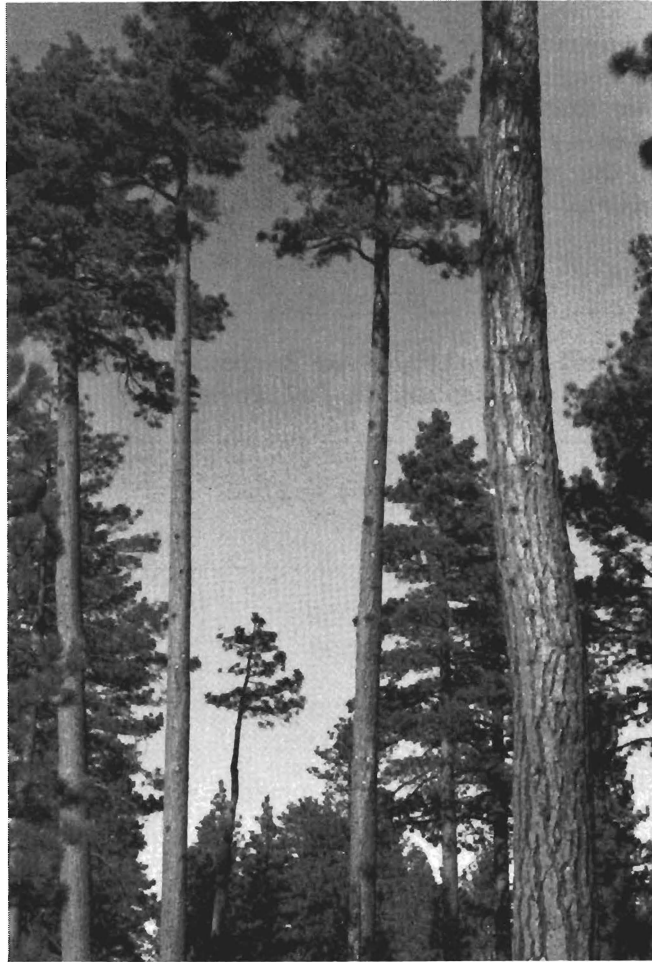


Figure 3. High value pines after removal of branches heavily infected with dwarf mistletoe, southern California. (USDA-Forest Service)

NURSERY DISEASES. As in 1986, diseases were apparently a minor problem in California forest tree nurseries. Only two detection reports, both from Humboldt Nursery (Humboldt County) were received. *Phomopsis* canker, caused by *Phomopsis occulta*, caused minor damage on 2-0 Douglas-fir seedlings. *Fusarium* hypocotyl rot, caused by *Fusarium oxysporum*, was reported on 1-0 Douglas-fir.

ROOT DISEASES. Of approximately 16 million acres of commercial forest land in California, about 2 million acres are infested with root disease. Annual mortality from annosus and black stain root diseases were recently summarized (Table III). These losses represent stumpage values only, and do not include other factors such as growth reduction, land out of production for a rotation, or recreational and hazardous tree losses.

Table III. Annual Mortality from Annosus and Black Stain Root Diseases in California

Disease/Host	Acres Infested	Volume Killed (MCF)	Stumpage Value of Dead Timber
annosus/pine	1,400,000	10,000	\$7,837,500
annosus/fir	600,000	8,500	\$1,804,125
black stain/pine	6,000	1,000	\$783,750
black stain/D-fir	2,000	300	\$96,225
TOTAL	2,008,000	19,800	\$10,521,599

Annosus root disease, caused by Heterobasidion annosum, caused damage to ponderosa pines at a progeny test site on the Amador Ranger District, Eldorado National Forest (Amador County). Annosus root disease was found killing Pacific madrone over much of the eastern edge of the Boggs Mountain Demonstration State Forest (Lake County). The disease was also found on sugar pine in several locations on the Demonstration Forest.

Armillaria sp. was associated with abnormal and distorted root systems on four-year-old ponderosa pines at a progeny test site on the Greenhorn Ranger District, Sequoia National Forest (Kern County), and with ponderosa pines in a five-year-old plantation on the LaPorte Ranger District, Plumas National Forest (Yuba County). Armillaria root disease was responsible for scattered and group mortality in Mendocino, Lake, and Marin Counties of the following trees: Douglas-fir, ponderosa pine, Bishop pine, Monterey cypress, chinquapin, tanoak, and various oaks. Attacks in many cases could be related to moisture stress.

Black stain root disease, caused by Ceratocystis wageneri, was found on two naturally regenerated ponderosa pines in a clearcut on the McCloud Ranger District, Shasta-Trinity National Forests (Siskiyou County). This area was harvested in 1978-79 because of severe mortality from the root disease.

Port-Orford-cedar root disease, caused by Phytophthora lateralis, was confirmed by pathologists of the Department of Forestry and Fire Protection and Department of Food and Agriculture on planted cedars in the town of Trinidad (Humboldt County). Cedar bark beetles were abundant in the diseased trees.

RUST DISEASES. The impact of white pine blister rust on sugar pine continues to be prominently visible throughout the Sierra Nevada. Much of the branch flagging now present seems to date back to 1983 and 1984 infections. Infections are common on sites previously considered to be low hazard for rust, such as upper slopes and ridge tops. The Forest Service is discouraging the planting of more than 10% non-rust resistant sugar pine stock in any single plantation.

Western gall rust (Endocronartium harknessii) was widespread on lodgepole pine in north central and northeastern California. It was killing seedlings and branches of larger trees over a wide area in Lassen, Plumas, and Shasta Counties.

Stalactiform rust (Peridermium stalactiforme) was causing branch cankers on Jeffrey pine north of Truckee (Nevada County).



Figure 4. True mistletoe, Phoradendron villosum spp., on oaks growing in a campground in the San Bernardino Mountains, southern California. (USDA-Forest Service)

TABLE IV. FOREST DISEASES REPORTED - 1987^a

AGENT	HOST	COUNTY
<u>ABIOTIC INJURIES</u>		
Chemical (Magnesium chloride)	PP	Tuolumne
Ozone	JP	El Dorado
		Alpine, NV
Red belt	PP, JP	Lassen
Winter damage	SB	Nevada
	JP, PP	Sierra
	JP	Ventura
	CP	Los Angeles
	PP	El Dorado
	WF	Plumas
Unknown	BM	Trinity,
		Shasta
<u>CANKER DISEASES</u>		
<u>Cytospora abietis</u>	RF, WF	Shasta
	SRF	Trinity
	RF	Shasta
		Alpine
<u>Diplodia quercina</u>	RF, WF	
<u>Fusarium subglutinans</u>	LO	San Luis Obispo
	MP	Monterey,
		Alameda,
		Santa Cruz,
		San Mateo,
		Santa Clara
	BP	Santa Cruz
	ISP	Santa Clara
<u>Fusicoccum</u> sp.	PM	El Dorado
		Santa Cruz
<u>Peridermium stalactiforme</u>	JP	Nevada
<u>Sclerophoma semenospora</u>	DF	Humboldt
<u>DECAY</u>		
<u>Echinodontium tinctorium</u>	RF, WF	Alpine

^aNot a complete listing for all locations reported, nor for reports of common diseases.

TABLE IV (Cont.)

AGENT	HOST	COUNTY
<u>FOLIAGE DISEASES</u>		
<u>Cryptostictus</u> sp.	PM	El Dorado
<u>Elytroderma deformans</u>	PP	Siskiyou
	PP, JP	San Bernardino
<u>Lirula abietis-concoloris</u>	WF	San Bernardino
<u>Scirrhia pini</u>	MP	Humboldt
<u>NURSERY DISEASES</u>		
<u>Fusarium oxysporum</u>	DF	Humboldt
<u>Phomopsis</u> sp.	DF	Humboldt
<u>PARASITIC PLANTS</u>		
<u>Arceuthobium americanum</u>	LP	Alpine
<u>Arceuthobium abietinum</u> f.sp.	SRF	Trinity
<u>magnificae</u>	RF	Shasta
		Alpine
<u>Arceuthobium campylopodum</u>	PP	Tehama
	JP	Alpine
	PP, JP	El Dorado
<u>Phoradendron bolleanum</u> ssp.	WF	San Bernardino
<u>pauciflorum</u>		San Bernardino
<u>Phoradendron juniperinum</u> ssp.	WJ	Alpine
<u>juniperinum</u>		
<u>Phoradendron juniperinum</u> ssp.	IC	San Bernardino
<u>libocedri</u>		
<u>Phoradendron villosum</u> ssp.	BO	San Bernardino
<u>villosum</u>		

TABLE IV (Cont.)

AGENT	HOST	COUNTY
<u>ROOT DISEASES</u>		
<u>Armillaria</u> sp.	PP	Kern
	PP	Yuba
<u>Ceratocystis</u> <u>wageneri</u>	DF	Plumas
	DF	Tehama
	PP	Siskiyou
<u>Heterobasidion</u> <u>annosum</u>	PP, Mz	Siskiyou
	PP	Amador
	PP	Siskiyou
	PM	Lake
	SP	Lake
	PP, JP	San Bernardino
	CP	
	RF	Alpine
<u>Phytophthora</u> <u>lateralis</u>	POC	Humboldt
<u>RUST DISEASES</u>		
<u>Endocronartium</u> <u>harknessii</u>	LP	Lassen, Plumas
		Alpine
<u>Cronartium</u> <u>ribicola</u>	SP	Mendocino
		Tehama
		Placer
		Alpine
<u>Peridermium</u> <u>stalactiforme</u>	JP	Nevada
	LP	Alpine

HOST ABBREVIATIONS

BM = Bigleaf maple	BO = Black oak
BP = Bishop pine	CP = Coulter pine
DF = Douglas-fir	IC = Incense-cedar
ISP = Italian stone pine	JP = Jeffrey pine
LO = Live oak	LP = Lodgepole pine
Mz = Manzanita	MP = Monterey pine
PM = Pacific madrone	POC = Port-Orford-cedar
PP = Ponderosa pine	RF = Red fir
SB = Snowbrush	SP = Sugar pine
SRF = Shasta red fir	WF = White fir

STATUS AND CONTROL OF WEEDS

Weeds are a continuing problem for the growth and survival of conifers throughout the state. The importance of weed control was illustrated this year by the fires occurring around the state. Field observations indicated that fires were more intense where increased amounts of aerial fuel, including brush fields, were present. In some areas fires were observed burning through weedy plantations, but burning out at the margins of plantations released from brush.

The primary source for weed control has been with the application of herbicides. The most recent figures from the California Department of Food and Agriculture indicate a total of 28,962 acres were treated in 1985 (Table 1). Figures were only available through August for the conditions report last year. Since some of the herbicides, particularly hexazinone and glyphosate, are applied in the fall, the total acres reported have been revised. Use for 1986 through June are shown in Table 2.

Table 1. Herbicide Use in California - 1985

Chemical	Acres Treated	
	Jan.-Aug.	Jan.-Dec.
Triclopyr	8,953	9,326
Hexazinone	351	8,333
2,4-D	5,602	6,816
Glyphosate	825	2,138
Atrazine/Dalapon	1,211	1,581
Simazine	0	370
Picloram	167	297
Dichlorprop	96	100
Asulam	5	5
TOTAL	17,210	28,962

Table 2. Herbicide Use in California: Jan.-June, 1986

Chemical	Total Acres Treated
2,4-D	5,875
Triclopyr	4,390
Glyphosate	1,229
Hexazinone	437
Atrazine/Dalapon	258
Picloram	234
Dichlorprop	111
TOTAL	12,534

STATUS AND CONTROL OF ANIMAL PESTS

The annual forest animal damage survey for the conditions report, historically conducted by Animal Damage Control-APHIS (formerly the US Fish and Wildlife Service), was not conducted in 1987. Norm Holgerson, Wildlife Biologist, who normally conducted the survey and prepared our report, retired from the Service and no one was hired to fill his position. Norm did an excellent job over the years, and his involvement is truly missed. Efforts are underway to correct the oversight. Indications received are that conditions of vertebrate pests are similar to previous years. However, black bear damage apparently continued to increase in Humboldt and Del Norte counties.

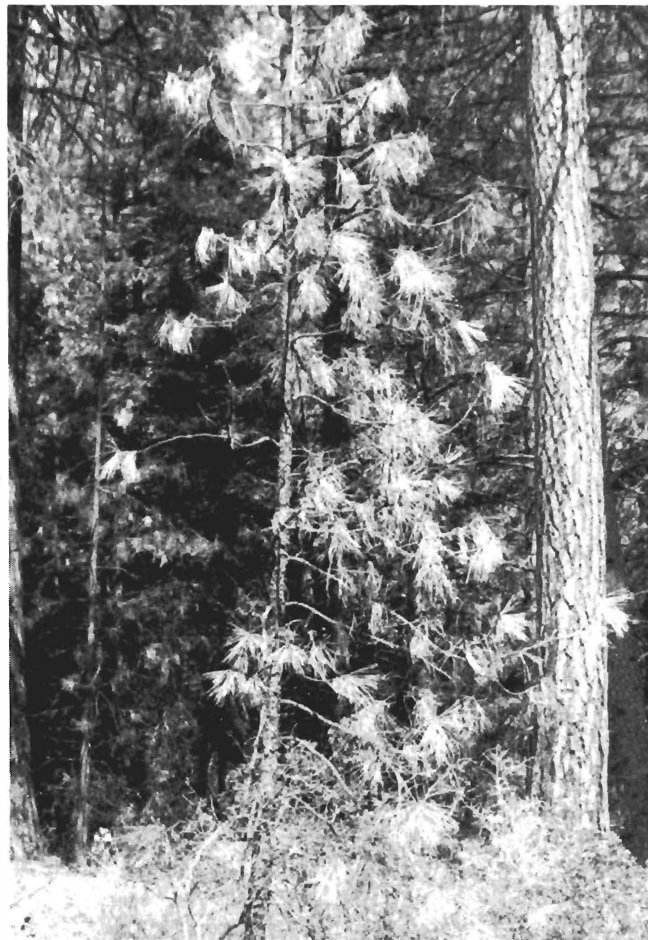


Figure 5. A natural twelve-foot sapling of ponderosa pine that has been severely infested with gouty pitch midge for ten consecutive years, Shasta-Trinity National Forest. The top is dead.

THE GOUTY PITCH MIDGE

Adults of the gouty pitch midge, Cecidomyia piniinopis Osten Sacken (Diptera: Cecidomyiidae), are small mosquito-like flies. Pitch midge adults emerge from late March through early May and lay eggs on expanding branch and leader tips of the primary host, ponderosa pine. The larvae that hatch from the eggs bore through the surface of the shoot and embed themselves in the vascular tissue. The pink to red larvae feed in resin-filled cavities until late winter or early spring when they crawl out of the feeding pits to pupate on the needles.

A few feeding pits on a shoot will have little effect on the tree, but as the number increases, growth and conduction will be affected. If the pits girdle the shoot, it will die. When the pits are distributed on only one side of the twig, the difference in growth rate causes a twisted branch or leader. The feeding pits cause a canker-like scar which remains visible on the twig for many years. Repeated infestations will reduce the growth rate, cause deformity and predispose the tree to attack by other organisms.

Trees under three years of age are seldom attacked. Foliage more than 16 feet high is only occasionally infested (see p. 4, gouty pitch midge). Host tree vigor has little to do with susceptibility to the gouty pitch midge, but it will affect the impact of the infestation. The same level of infestation is more likely to produce twig and leader death in slowly growing trees than in rapidly growing ones.

The susceptibility of ponderosa pine to the gouty pitch midge is related to the type of surface of the spring shoots. During the period of active new growth, trees will exhibit one of three genetically controlled phenotypes. The shoots will either be resinous, dry and smooth, or covered with a waxy bloom. Trees with resinous shoots normally comprise about one-third of the population and are much more prone to serious pitch midge damage, although the midge is capable of developing in all three types.

Midge damage can be minimized in regeneration programs by avoiding ponderosa pine with resinous spring shoots for cone collections, seed trees or tree breeding projects. Damage will not be totally eliminated even if most of the regeneration display the less susceptible (dry and smooth or waxy) phenotypes because vegetative competition and population levels of the midge also influence the level of damage. When midge populations are very high, some trees displaying the unsusceptible phenotype will be attacked and conversely, when midge levels are low, some susceptible trees will escape attack.

SURVEYS AND EVALUATIONS

DEMONSTRATION THINNING PLOTS IN THE EASTSIDE PINE TYPE ON THE LASSEN NATIONAL FOREST. In 1978-79 the Forest Service established plots in the eastside pine type to show the effects of thinning on pest-caused tree losses in areas of high tree mortality. The stands chosen were mostly pole-size ponderosa pine mixed with some white fir and incense-cedar, growing on medium to low sites, and ranging in age from 70 to 90 years. Within the demonstration lots, four levels of stocking density -- 40, 55, 70, and 100 percent of normal basal area -- were established to demonstrate the biological and economic alternatives available for management planning. (Normal basal area is the basal area that a stand should have when fully stocked with trees, which, in the demonstration areas, ranges from 185 to 215 sq ft/ac depending on site quality.) Eight years after thinning, the treatments had reduced mortality from 90 to 100 percent of the level in unthinned stands (see table below).

**Table V. COMMERCIAL TREE MORTALITY BY STOCKING LEVEL,
EIGHT YEARS AFTER THINNING.**

YEAR	RESIDUAL STOCKING AFTER THINNING ^b			
	40%	55%	70%	100%
	Trees per Acre			
1980	0.0	0.2	0.2	2.4
1981	0.0	0.0	0.7	2.4
1982	0.0	0.5	0.3	3.6
1983	0.0	0.1	0.8	4.1
1984	0.0	0.0	0.0	1.0
1985	0.0	0.2	0.0	0.6
1986	0.0	0.0	0.0	1.3
1987	0.0	0.0	0.0	0.9
Mean	0.0	0.1	0.2	2.0
Range	0	0-0.5	0-0.8	0.6-4.1
Percent Mortality Reduction				
Compared with Normal Basal Area	100.0	95.0	90.0	---

a. Commercial trees are 8 inches dbh and larger, with straight boles, yielding a 10-foot log with a 6-inch top. Mountain pine beetle killed the trees.

b. Percent of normal basal area.

BLISTER RUST RESISTANT SUGAR PINE. Since 1981, a cooperative program for finding blister rust resistant sugar pine at Mountain Home Demonstration State Forest has identified 35 resistant parent trees. Three of these trees are homozygous for resistance, the others are heterozygous. Rust resistant seedlings have been experimentally planted at Mountain Home Demonstration State Forest, Sequoia and Sierra National Forests, and on the Tule River Indian Reservation. More test plantings are planned to test the stock for rust resistance and general growth qualities. All seed lots have been tested at the Institute of Forest Genetics, Pacific Southwest Experiment Station, and seedlings are grown at the California Department of Forestry and Fire Protection's Magalia Nursery.

EVALUATION OF VELVET TOP FUNGUS AND HAZARD TREES. At the request of the California Department of Parks and Recreation, the California Department of Forestry and Fire Protection investigated whether Phaeolus schweinitzii, the velvet top fungus, could be seriously weakening tree roots in north coast campgrounds. Aided by a backhoe, pathologists examined roots from freshly cut stumps of trees removed because of concern for windthrow. Healthy and badly decayed roots were examined. Although decay was present, it could be found only in one or two roots in any one root system and, therefore, did not appear to constitute a hazard situation for that area. Detecting multiple diseased roots will aid in determining increased hazard potential of individual trees.

DUTCH ELM DISEASE. Overall, Dutch elm disease (DED) incidence continues to decrease from 1985 levels and remains confined to the Bay Area. No further disease incidence was found in the Vacaville area (one tree in 1986).

New locations for DED include Orinda and El Sobrante (Contra Costa County), southeast San Jose (Santa Clara County), and South San Francisco (San Mateo County). Contra Costa, Marin, and Santa Clara Counties and Oakland (Alameda County) will likely continue to be hot spots in the future.

COUNTY	NUMBER OF CONFIRMED DED ELM TREES			
	1984	1985	1986	1987
Alameda	1	0	11	7
Contra Costa	29	21	30	35
Marin	71	154	125	83
Napa	3	2	3	2
San Francisco	0	0	0	0
San Mateo	54	63	44	47
Santa Clara	17	34	41	20
Solano	0	0	1	0
Sonoma	<u>13</u>	<u>28</u>	<u>14</u>	<u>16</u>
TOTAL	188	302	269	210 ^a

^a Through November 30, 1987

UNITED STATES DEPARTMENT OF AGRICULTURE - FOREST SERVICE		CALIFORNIA FOREST PEST COUNCIL	
FOREST PEST DETECTION REPORT			
I. FIELD INFORMATION (See instructions on reverse)			
1. COUNTY:	2. FOREST (FS ONLY):	3. DISTRICT (FS ONLY):	
4. LEGAL DESCRIPTION: T. _____ R. _____ S. _____	6. LOCATION:	7. LAND OWNERSHIP: 1. FOREST SERVICE ☐ 2. OTHER FEDERAL ☐ 3. STATE ☐ 4. PRIVATE ☐	
5. DATE:			
8. SUSPECTED CAUSE(S) OF INJURY: 1. INSECT ☐ 5. CHEMICAL ☐ 2. DISEASE ☐ 6. MECHANICAL ☐ 3. ANIMAL ☐ 7. WEED ☐ 4. WEATHER ☐ 8. UNKNOWN ☐	9. SIZE(S) OF TREE(S) AFFECTED: 1. SEEDLING ☐ 4. SAWTIMBER ☐ 2. SAPLING ☐ ☐ 3. POLE ☐ 5. OVERMATURE ☐	10. PART(S) OF TREE(S) AFFECTED: 1. ROOT ☐ 5. TWIG ☐ 2. BRANCH ☐ 6. FOLIAGE ☐ 3. LEADER ☐ 7. BUD ☐ 4. BOLE ☐ 8. CONE ☐	
11. SPECIES AFFECTED:	12. NUMBER AFFECTED:	13. ACRES AFFECTED:	
14. INJURY DISTRIBUTION: 1. SCATTERED ☐ 2. GROUPED ☐		15. STATUS OF INJURY: 1. DECREASING ☐ 2. STATIC ☐ 3. INCREASING ☐	
16. PLANTATION ? 1. YES ☐ 2. NO ☐	17. STAND COMPOSITION (SPECIES):	18. STAND AGE AND SIZE CLASS:	
	19. STAND DENSITY (BASAL AREA):	20. SITE QUALITY:	
21. PEST NAMES (IF KNOWN), AND REMARKS (SYMPTOMS AND CONTRIBUTING FACTORS):			
22. SAMPLE FORWARDED ? 1. YES ☐ 2. NO ☐	23. ACTION REQUESTED: 1. YOUR INFORMATION ONLY ☐ 2. LAB IDENTIFICATION ☐ 3. FIELD EVALUATION ☐	24. REPORTER'S NAME:	25. REPORTER'S AGENCY:
		26. REPORTER'S ADDRESS, ZIP CODE, & PHONE NO.:	
II. REPLY (Pest Management Use)			
27. RESPONSE:			31. FILE NO.
28. REPORT NUMBER:	29. DATE:	30. EXAMINER'S SIGNATURE:	

RS-3400-1 (Rev. 2/82)

FOREST PEST DETECTION REPORT FORM. The Conditions Report was compiled from information provided by Federal, State, and private forest land managers and individuals. Copies of this form are available at local offices of the Forest Service or the California Department of Forestry and Fire Protection.

THE COOPERATIVE FOREST PEST DETECTION SURVEY is sponsored by the California Forest Pest Council. The Pest Council encourages Federal, State, and private land managers and individuals to contribute to the Survey by submitting pest injury reports and samples in the following manner.

Federal Personnel. Send all detection reports through channels, and mail injury samples with a copy of this report to: USDA, Forest Service, Forest Pest Management, 630 Sansome St., San Francisco, CA. 94111

State Personnel. Send all detection reports through channels, and mail injury samples with a copy of this report to: California Dept. of Forestry & Fire Protection, 1416 - 9th Street, Sacramento, CA. 95814

Private Land Managers and Individuals. Send all detection reports and samples to: California Dept. of Forestry & Fire Protection, 1416 - 9th Street, Sacramento, CA. 95814

COMPLETING THE DETECTION REPORT FORM

Heading (Blocks 1-7). Enter all information requested. In Block 6, Location, note distinguishing landmarks and place names so that the injury center can be relocated. If possible, attach a location map to this form.

Injury Description (Blocks 8-15). Check as many boxes as are applicable, and fill in the requested information as completely as possible.

Stand Description (Blocks 16-20). This information will aid the examiner in determining how the stand conditions contributed to the pest problem. In Block 17, indicate the major tree species in the overstory and understory. In Block 18, indicate the stand age in years, and/or the size class (seedling-sampling; pole; young sawtimber; mature sawtimber; overmature, or decadent).

Pest Names (Block 21). Write a detailed description of the pest or pest, the injury symptoms, and any contributing factors.

Action Requested (Block 23). Mark "Field Evaluation" only if you consider the injury serious enough to warrant a professional evaluation. Mark "Your Information Only" if you are reporting a condition that does not require further attention. All reports will be acknowledged and questions answered on the lower part of this form.

Reply (Section II). Make no entries in this block; for examining personnel only. A copy of this report will be returned to you with the information requested.

Handling Samples. Please submit injury samples with each detection report. If possible, send several specimens illustrating the stages of injury and decline. Keep samples cool and ship them immediately after collection. Send them in a screw-top mailing tube or other sturdy container, and enclose a completed copy of the detection report.

YOUR PARTICIPATION IN THE COOPERATIVE FOREST PEST DETECTION SURVEY IS GREATLY NEEDED AND APPRECIATED. Additional copies of this form are available from the Forest Service, Forest Pest Management, and from the California Department of Forestry and Fire Protection.

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